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NEW MICRO-LEPIDOPTERA.

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New species of Micro-Lepidoptera are accumulating so rapidly that it seems a necessity to get them described and labelled in order to properly take care of them. This is especially so in the case of species named for correspondents, and to overcome the objection of having numbers of *MS.* names in collections.

Enarmonia Youngana, sp. nov.—Expanse, 8 to 11 mm.

Head smoky-black, scales with a metallic reflection, tips paler. Palpi yellowish-gray. Antennæ dark brown, obscurely annulated with shining yellow. Thorax blackish-brown, minutely dotted with metallic. Abdomen black, dotted with golden metallic scales.

Fore wing shining bronzy-brown; crossed at middle by a pair of shining bluish-white fasciæ, and similar pair in the outer third of wing.

The inner half of the dark basal area is heavily overlaid with the bluish-white metallic scales. There are three pairs of white costal spots, followed by a single one before the apex. The inner pair at inner third are the beginning of the first pair of metallic fasciæ, which curve outwardly to middle of wing, then drop directly to dorsal margin, where they are very much wider. The second pair of white costal spots are just beyond the middle, and from the two of them a single streak of blue-metallic runs, outwardly oblique, to the middle of the wing. The third pair of white costal spots are in outer fourth, and from each a blue-metallic fascia proceeds, outwardly oblique, to middle of wing, thence angles inward nearly to but not reaching dorsum at angle; between the two is a black ocellic spot, divided by three lines of golden scales into four horizontal bars; opposite the ocellic spot and on inner side of this fascia is a similar velvety-black spot. From the seventh white costal spot is a short spur of metallic-blue defining a lunate yellowish-white apical spot.

Beyond the middle of the wing the dark ground colour is overlaid with vertical wavy rows of golden-yellow scales. The three outer costal spots are each marked in the centre by a tiny black point. A line of black

scales defines the apex and outer margin, and is interrupted by two yellow dashes above the middle and a broader one just above anal angle. Cilia leaden-metallic.

Hind wing smoky-brown, cilia bleached straw colour. Under side fore wing leaden-brown, with the costal spots and black terminal line repeated.

Nine specimens, bred by Mr. C. H. Young, at Hurdman's Bridge, Ottawa, Canada. Dr. Fletcher informs me that the larvæ are found during the winter in the centre of the cones of White Spruce, *Picea alba*, the moths emerging in the ensuing spring.

Co-types in collections of Fletcher, Young and Kearfott.

Venation: Fore wing, all veins separate, outer margin straight, but very much oblique. Hind wing, 3 and 4 stalked, 5 approximate to 4; 6 and 7 very close at base.

Named in honour of Mr. Young, whose industry and perseverance in working out obscure life-histories of insects, in many cases of extreme economic importance, is of the greatest scientific value.

Epagoge lycopodiana, sp. nov.—Expanse, 13 to 16 mm.

Head, palpi, thorax ochreous-yellow. Palpi outwardly shaded with red, a streak of the same colour on each side of the thorax and at base of patagia. Antennæ reddish-yellow at base, becoming smoky-fuscous beyond. Abdomen smoky-fuscous, anal tuft yellowish. Legs pale ochreous, dusty with smoky-brown.

Fore wing ochreous-yellow, evenly mottled with red. A deep Indian-red fascia begins at costa, between third and middle, and goes obliquely to outer third of dorsum, where it joins a similar fascia, which runs obliquely outward to end of cell. From the costa at outer fourth a line of deep red scales curves outwardly to the anal angle; beyond this is a short fascia from costa, just before apex, ending in middle of wing, and paralleling upper half of termen. These fasciæ are overlaid with shining bluish scales. In some specimens the deep Indian-red colour almost covers the entire outer part of the wing, from the inner fascia, and in these dark specimens there is only a small patch of the ground colour above the end of cell, on the costa, with a slight shading of yellow before the anal angle. Cilia ochreous-yellow.

Hind wing very dark smoky fuscous; cilia metallic-fuscous, under side leaden black.

Under side fore wing reddish-black, with a yellowish spot above end of cell; extreme costal edge and cilia reddish-yellow.

Twelve specimens, bred by Mr. C. H. Young, from larvæ feeding in Club Moss, *Lycopodium*, at Hurdman's Bridge, Ottawa, Canada.

Co-types in collections of Fletcher, Young and Kearfott.

This species is very like *Epagoge sulfureana*, Clem., and I have held it for over two years, thinking it possibly might be a variety. I have examples of the latter from nearly all of the Gulf and Eastern States, and while they exhibit a very wide range of variability, there is not one that even approximates this intensely-dark form. It is nearer *E. tunicana*, Wlsm., but is a brighter red.

Venation: Fore wing, 7 and 8 stalked, others separate; hind wing, 3 and 4 approximate, but not connate, 6 and 7 connate, not stalked. In Meyrick's Handbook of British Lepidoptera, the synopsis of this genus states that 3 and 4 of hind wing are connate, and 6 and 7 stalked.

Recurvaria coniferella, sp. nov.—Expanse, 9 mm.

Head opalescent-white, palpi pale cinereous, third joint ringed with black at base and tip. Antennæ whitish, annulated with brown. Abdomen and legs pale cinereous, the latter heavily ringed with black.

Fore wing yellowish-white or pale cinereous, overlaid with white in the middle of the wing from base to end of cell, and above the fold. There are the usnal three oblique fasciæ, all much broken into spots. The inner consists of a black dot on costa at base, and tuft of black and white raised scales below the fold at inner fifth. The second consists of a black dot on costa before the middle, hardly separated from a larger dot below it on the middle of the wing; below this is a third distinctly separated dot above the dorsum. The outer fascia begins in outer third of costa, with a large dot; below it, towards base, is a small round dot, and another towards apex in the form of a short horizontal line; below the first of these, above the dorsum, is another small dot. All of these dots, except on the costa, consist of tufts of black raised scales, bounded outwardly with white raised scales. The apex of wing is heavily powdered with black, obscurely forming four black marginal dots. Cilia gray, overlaid with black.

Hind wing pale gray, cilia yellowish-gray.

Two specimens, bred from larvæ on pine, Ottawa, Canada, by Mr. Arthur Gibson. Issued June 20, 1905. Type in my collection. Co-type in Dr. Fletcher's collection.

In general appearance this species most nearly resembles *R. apicitripunctella*, Clem., the larvæ of which are common on hemlock. *Coniferella* is smaller, the arrangement of spots different, and is a very much darker species.

Recurvaria Gibsonella, sp. nov.—Expanse, 11 mm.

Head opalescent-white, palpi whitish, clouded with light brown on inner sides of second joint, outer joint black, with a narrow white ring at base, a broader one in the middle and a tiny point of white at apex. Antennæ whitish, annulated with dark brown. Thorax whitish-yellow, overlaid with black and brown. Abdomen opalescent-white and brown. Legs yellowish-white, heavily ringed with black.

Fore wing white, shaded with yellowish on apex and crossed by three broad oblique dark brown bands. The inner from costa at base, continuing to below the fold, but not reaching dorsal margin. The second from inner third at costa, broadens at the middle and sends a long spur into the outer fascia. The outer begins on costa at outer fourth, and is the broadest of the three; it recurves inwardly to dorsum. The apex and outer margin are dark brown, enclosing an anti-marginal white spot, which is divided by a streak of dark scales. The usual tufts of raised scales occur on the dorsal half of the three dark fasciæ. Cilia yellowish-white, heavily overlaid with black.

Hind wing yellowish-gray, cilia the same.

Three specimens, bred from larvæ on *Juniperus communis*, by Mr. Arthur Gibson, Ottawa, Canada. Types in my collection, co-types in Dr. Fletcher's collection.

This species is not at all like the specimens I have bred from the same food-plant in New Jersey, and described in the Journal of the New York Entomological Society, September, 1903, but more nearly resembles the two species bred from Spruce and Arbor-vitæ.

Recurvaria obscurella, new name.—I propose this name in place of var. *nigra*, Jour. N. Y. Ent. Soc. XI., 1903, p. 156, as the latter is preoccupied.

Symphysa simplicialis, sp. nov.—Expanse, 11 to 15 mm.

Labial palpi upturned, second joint tufted in front, third joint acuminate; maxillary palpi short, filiform, both pale cream colour, the former clouded with brownish on outside of second and third joints. Tongue long, concealed by well-developed tufts of creamy-white scales.

Antennæ slightly serrate, cream colour at base, outer joints annulated with grayish-fuscous. Thorax grayish-white. Abdomen fuscous and tuft cream-white. Legs cream white, minutely dotted with brown. Tarsi annulated with brown.

Fore wing dark gray, minutely dotted with blackish-gray, a darker shade across the wing at inner third, a short, narrow, outwardly oblique curved line from middle of costa to upper edge of cell, a similar fine white ante-terminal line from costa beyond outer fourth, curving under apex and down to dorsal margin, just before anal angle, slightly indented at lower third. A blackish preciliate line interrupted by the veins. Cilia paler.

Hind wing pale fuscous, thickly dotted with black scales along dorsal and outer margins. An obscure whitish ante-terminal line, strongest towards dorsal margin ; slightly indented at upper third.

Under side, both wings shining pale gray, the white lines faintly repeated.

Two ♂ specimens, collected by Professor F. H. Snow, one Brownsville, Texas, June, and one San Bernardino Ranch, Cochise Co., Arizona, 3,750 feet elevation, August.

One type in collection of Kansas Academy Sciences, and one in my collection.

Differs from *renicularis*, Zell., in the absence of white discal spots, and from both *renicularis* and *eripalis*, Grote, in the outer white lines of both wings being very much closer to the outer margin.

Prionapteryx baboquivariella, sp. nov.—Expanse, 22 to 28 mm.

Head, palpi and thorax sordid white. Scales of outer joint of labial palpi leaden-gray, of maxillary palpi cinnamon-brown ; thorax heavily overlaid with brown, and much darker than the collar and patagia. Abdomen and anal tuft creamy-white. Legs creamy-white. Anterior tibiæ dotted with brown. All tarsi annulated with the same colour.

Fore wing pale olivaceous-brown, with the lower median vein and the veins in the outer third of wing overlaid with white, below the white median vein is a much darker brown streak from base to anal angle, and a dark streak above it from base to end of cell. The outer half of costa is shaded with white, through which run four outwardly-oblique brown lines, the inner, at end of cell, runs into the brown lines above and below the median vein, forming an obscure dark dentate transverse line ; a similar preciliate line of white from costa, outwardly oblique for one-third the width of wing, thence inwardly oblique to a third above dorsal margin,

thence obscurely dentate to margin, is inwardly outlined with darker brown; a short white line from costa at apex to termen. In the middle of the outer margin is a small white ocellic dot, just below the incision, above is a short dark bar, and before it the ground colour is heavily sprinkled with darker scales. Cilia sordid white, divided by a brown line above the incision. Hind wings pale cinereous, with a darker shade before the cilia, which are sordid white, with a slightly darker basal line.

Five specimens, four collected by Prof. F. H. Snow, Baboquivaria Mountains, Arizona, and one Huachuca Mountains, Arizona, O. C. Poling. Co-types in Kansas Academy of Sciences and my collection.

Nearest to *achatina*, Zell., but can be readily separated by the two fine white lines on costa just before apex, which are lacking in *achatina*, and in their place is a rather broad white streak. The four specimens from Prof. Snow are rather badly rubbed, especially over the middle of the wing, causing an impression of a broad white median band.

Plutella yumaella, sp. nov.—Expanse, 16 to 27 mm.

Head with loose scales; antennæ simple, basal joint with dense flaps; labial palpi, second joint with short dense tuft above appressed to face, third joint short, obtuse; both head, palpi and thorax grayish-white, mixed with black scales, patagia tipped with ochreous scales, posterior thoracic tuft white, stained at the ends with ochreous.

Fore wing elongate ovate, whitish-gray, mottled with black. The basal area to one-fourth on costa and one-third on dorsal margin is heavily mottled with black, beyond is a narrow oblique whitish fascia, beyond this the wing is heavily mottled, but interrupted on upper half by a crescent-shaped whitish fascia, which leaves costa at middle and regains it at outer fourth; the apical fifth is whitish, less overlaid with black. Cilia whitish-gray, speckled with black.

Hind wing and under side of both wings cinereous. Abdomen cinereous, with a tuft of ochreous scales on each side on the middle segments, anal tuft dark ochreous. Legs cinereous, anterior and middle and tarsi of posterior legs heavily speckled with black.

Two specimens, San Bernardino Ranch, Cochise Co., Ariz., 3,750 feet elevation, August (F. H. Snow). One, Brownsville, Texas, June (F. H. Snow). One, Gila Co., Ariz., June (O. C. Poling). One, Baboquivaria Mts., Pima Co., Ariz., July 15-30 (O. C. Poling). Two, So. Arizona (Poling). Nine specimens, Yuma Co., Arizona Desert, received from J. B. Smith.

Types: University of Kansas and my collection.

Placed in *Plutella* tentatively; agrees with Meyrick's definition, except that 3 and 4 hind wings are not approximate, the palpi are tufted above and not beneath.

Genus DOROTA, Busck.

The moths of this genus superficially resemble Crambids, on account of their long, extended labial palpi; so far they have only been taken in Arizona and California, and only a very few specimens are known.

I have a fine specimen of *lineata*, Wlsm. (*virgatella*, Busck), from Cochise Co., Ariz., June 4, 1904, from Geo. Franck, and two very distinctly marked species, which are described below. The four known species can be separated by the following table:

Fore wing with lighter median streak ..... 1.
Fore wing without lighter median streak ..... 2.
1. Ground colour light ochreous-brown ..... = mediolinella.
   Ground colour ashy-gray ..... = albastrigulella.
2. Fore wing marked with darker lines ..... = lineata.
   Fore wing not marked with darker lines ..... = inorratella.

Dorota mediolinella, sp. nov.— ♀. Expanse, 27 mm.

Palpi, head and thorax pale yellowish-brown, speckled with gray-brown; palpi long, about 4 mm., porrect, outer joint sharply bent downward.

Fore wing 3½ times as long as broad, lanceolate, pale yellowish-brown, a paler creamy-white streak from base to apex, interrupted at end of cell with a few dark scales, with a darker geminate-blackish streak above it. A slightly darker shade above dorsal margin, and a cluster of dark scales on fold at inner third.

A number of black dots are scattered over the wing, notably a line of eight on inner half close to costa, becoming more widely separated outwardly, one on upper edge of dark streak near apex, about eight in pale streak, about fifteen in three irregular horizontal rows on outer third below middle, four of which are in the cilia, a line of six in two groups of three above fold in middle of wing and one above the fold. Extreme dorsal edge dotted with brown scales.

Hind wing, fuscous-gray, slightly shining, cilia same. Under side both wings fuscous-gray, with a brassy tinge. Abdomen same, anal tuft paler. Legs cream-white.

One specimen, Claremont, Cal. No. 3889. C. F. Baker. Type in my collection.

Dorota albastrigulella, sp. nov.—♂. Expanse, 21 mm.

Palpi, head, thorax and fore wing fuscous, strigulated with pure white. Palpi porrect, 2.5 mm. long, outer joint not drooping, but bent outward, at an angle of about fifteen degrees, the brush from second joint extends as far as apex of third, but is porrect, and with the diverging outer joint forms a Y at end of each palpus. The white strigulations of fore wing are most heavily laid between one-third below costa and one-third above dorsal margin, but hardly in a well-defined streak; towards the apical margin some of the veins are bare of white scales, forming short, ill-defined dark streaks. A dark dot at end of cell and another at inner fourth, both about the middle of wing. Cilia white, divided by a fuscous line. Hind wing fuscous-gray, darker before cilia. Under side, both wings dark fuscous-gray. Abdomen the same, anal tuft paler. Legs yellowish-white.

One specimen, Placer Co., Cal., June 1, 1904. Arthur H. Vachell. Type in my collection.

Holcocera Arizoniella, sp. nov.—Expanse, 15 to 18 mm.

Head, palpi, antennæ, thorax, abdomen, legs and fore wings creamy white; hind wing shining gray-white, cilia cream-white, anal tuft ochreous-white.

Three specimens, San Bernardino Ranch, Cochise Co., Arizona, 3,750 feet elevation, August (F. H. Snow). Twelve specimens, Phœnix and Globe, Arizona, August and October (Kunzé).

Types in University of Kansas and my collection.

Incurvaria Taylorella, sp. nov.—Expanse, 16 mm.

Head hairy, pale straw-colour, darker above; palpi same, with a few burnished scales on outside; abdomen yellowish-white; legs the same colour, but annulated with burnished scales; antennæ pale-straw colour.

Fore wing burnished purple, with a coppery reflection, with four pale yellow spots; a triangular spot on outer third of costa, pointed on its lower end, which extends a trifle more than a third across wing, curved obliquely inwards; below this, on dorsal margin, a nearly square spot, extending upwards a third of the width of wing, and separated by the spot above it by a trifle less than one-third; a larger dorsal spot at inner fourth broadest on dorsal margin, convex on its outer and concave on its inner edge, extends obliquely to within one-third of costa; a spot in the apex with a spur running down through the cilia of the termen nearly to the anal angle.

Hind wings fuscous, with a purplish reflection. Under side of both

wings same as upper, but lighter in colour, the spots of the fore wing faintly repeated.

Two ♀ specimens, Wellington, B. C., May 15, Rev. Geo. W. Taylor; Mt. Washington, N. H., Mrs. A. T. Slosson.

Types in Mrs. Slosson's and my collections.

Closest to *capitella*, Clerck (Europe), which differs in the inner dorsal spot extending entirely across the wing; the outer spots approach more closely together, and the apical spot is absent. This species belongs in group I of Dr. Dietz's revision, and can readily be separated from the two American species by the inner dorsal mark, which in both extends from dorsal to costal margin.

Named in honour of Rev. G. W. Taylor, to whom I am indebted for many interesting specimens.

Amydria crescentella, sp. nov.—Expanse, 16 to 18 mm.

Palpi, head, antennæ and thorax very pale brown, dusted with dark brown, the latter predominant on external surfaces of palpi. Abdomen and legs pale cinereous, tarsi dusted with brown.

Fore wing creamy white, slightly dusted with brown scales; this light ground-colour only occurs in a large triangular basal patch, extending to a quarter on costa and nearly to middle on dorsal margin. A curved oblique fascia from middle of costa to end of cell, a similar but narrower fascia from costa just before apex, curving inwardly towards but not reaching the middle fascia. These two fascias are so sharply defined against the dark brown of the balance of the wing that they appear as a crescent-shaped band, interrupted in the middle.

The balance of the wing is cinnamon-brown, dotted with darker brown. In some specimens the pale basal area is rather heavily dusted with brown inwardly, leaving only the margin of the pale colour, forming a narrow oblique fascia. On the costa, within the crescent, are two pale dashes separated by a dark dot, and outwardly bounded by dark brown, which also extends below them. Before the middle of fascia the costa is cream colour, marked by a number of brown dots. On the outer margin is a line of dark brown dots, separated by a few paler scales. Cilia same as dark portion of wing.

Hind wing light cinnamon-brown, under side of both wings the same.

Five specimens, all Baboquivaria Mountains, Pima C., Arizona, July 15 to 30; two collected by Prof. F. H. Snow, three by Mr. O. C. Poling.

Types, University of Kansas and in my collection.

(To be continued.)

NEW SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, S.B., M.D., DECATUR, ILLINOIS.

Holomelina calera, n. sp.—Allied to *ostenta*, H. Edw., and *pomponia*, Druce, especially the latter.

♀. Expanse, 31 mm.

Agrees with Druce's figure, Biol. Centr. Amer. Het., plate 78, fig. 8, and with Hampson's description, Cat. Brit. Mus., Vol III., page 190, with the exception that fore wings have a crimson fascia along the outer margin as well as along costa, while the inner black area on secondaries is not extended to apex, there being only a small black patch on outer margin, just above and almost separated from the inner black area.

This insect will very likely prove to be a variety of *pomponia*, but as I do not know the range of variation of the latter I prefer for the present to consider it distinct.

Type.—One ♀. Huachuca Mts., Ariz., July.

Kodiosoma otero, n. sp.—♀. Expanse, 32 mm.

Fore wings brownish-black, fringe white. Costa narrowly edged with white. Fore wing crossed by narrow white, slightly incurved band at the junction of outer and middle thirds. This band is slightly constricted on median vein and just before reaching inner margin.

Hind wings red, black along costa and outer margin, this border is widest at apex, and gradually narrows out before reaching inner angle, fringe whitish.

Head and thorax black. Collar whitish. Abdomen red with black tip. A dorsal row of black spots. Thorax and abdomen black beneath. Legs black inwardly. Patagia red on outer side; tarsi white outwardly.

Type.—One ♀. Babaquivera Mts., Ariz., August.

Cerma cuerva, n. sp.—♂. Expanse, 27 mm.

Fore wing powdery, dark brown, with an olive-green tinge, sprinkled more or less with black and white scales. Basal half-line black, quite distinct, dentate. T. a. line dentate, almost transverse, blackish, the space between it and basal half-line somewhat paler than ground colour. T. p. black, edged outwardly with paler shade, extends outward along costa, then quite squarely across cell, thence inwardly to inner margin, quite irregular. Orbicular and reniform distinguished with difficulty, subequal, outlined by a few black scales. S. t. line very obscurely marked. Fringe checkered. Hind wing dark fuscous, with faint mesial band and dot,

fringe a trifle paler, with slightly darker mesial line. Head and thorax concolorous with fore wing, abdomen with hind. Basal joints of palpi black, tip yellowish-white.

Beneath all wings blackish-fuscous, with fairly distinct common mesial band. Fore wing shaded with yellow along costa towards apex. Hind wing with discal dot.

Type.—One ♂. Victoria, B. C., from Mr. A. W. Hanham.

It is possible this may turn out to be the same as *Cerma fascia*, Smith, though from the description and locality I do not think it likely.

Cerma sarepta, n. sp.—♂. Expanse, 22 mm.

Fore wing from base to t. a. line, from t. p. to s. t. line, together with reniform, pale greenish, remainder of wing brown, with somewhat of a bronze cast. Small black point on costa at base; basal half-line distinct, inclined outwardly, then inwardly. T. a. line rather far from base, black, almost transverse, scalloped. T. p. line rather widely removed, black, irregular. S. t. black, irregular, broken. Fringe checkered. Orbicular not apparent. Reniform pale green, outlined with blackish scales, open above. Head, collar and thorax pale green. Some of the scales, especially on the thorax posteriorly, black-tipped. Hind wing fuscous, with faint discal dot.

Beneath, fore wings pale fuscous, with paler spots indicating position of reniform above. Hind wing paler than fore, rather poorly-marked discal dot and mesial band.

Type.—One ♂. Wilgus, Ariz.

Cerma canoa, n. sp.—Expanse, 22 mm.

Fore wing gray, largely covered with darker gray and blackish-brown scales, not so powdery as most of the other species of this genus. Basal half-line only indicated by pale dot on costa, with a few black scales to inner side. T. a. transverse, fragmentary, represented by a pale patch on costa, one in centre of wing and one on inner margin, each followed by a black shade. The space between basal and t. a. line is dark blackish-brown, cut by longitudinal paler shades into two or three patches. T. p. line white, beginning with short angle on costa to inner side of reniform, thence extending outwardly along costa, then quite squarely around cell, thence with slight inward curve to inner margin, this line is white, quite even and well defined. The space between t. a. and t. p. line is blackish-brown, cut by pale longitudinal shades, leaving a dark patch on costa,

another between ordinary spots, a third just below that and a fourth on inner margin. S. t. line pale, irregularly incised opposite cell and at lower third of wing, here cutting through quite to t. p. line; the space between it and t. p. line is dark brownish-black, and, as just mentioned, is cut into three patches by the s. t. line. Beyond s. t. line the wing is pale grayish. Fringe gray and white checkered, with well-marked line at base, which is evenly and neatly cut into short bars by the same white dashes which cut the fringe. Orbicular minute white point. Reniform white-ringed, darker centered, rather narrow. The markings on the fore wing are neat and distinct, giving a well-marked checkered appearance, quite different from any other species in the genus. Hind wing dark fuscous, with a very faint discal dot and mesial band. Fringe pale, with darker mesial band.

Head and thorax concolorous with fore wing, abdomen with hind.

Beneath, fore wings fuscous, with obscure discal mark. Hind wing paler, with distinct discal dot and well-marked mesial band.

Type.—One ♂. Redington, Ariz.

Oligia ensina, n. sp.—♂. Expanse, 28 mm.

Fore wing reddish-brown. Basal half-line distinct, double, pale-filled. T. a. double, dark brownish-black, transverse across cell, then somewhat outwardly to inner margin, slightly scalloped. The upper half of wing, between basal half-line and t. a., dark blackish-brown, forming a strongly contrasting subquadrangular patch. Median shade not well marked, somewhat irregular and dentate. T. p. line double, pale-filled, inner portion more prominent, slightly scalloped. The space between t. a. and t. p. line is quite evenly coloured, there being, however, some blackish scales along costa, above reniform and a blackish streak beyond it. S. t. line fragmentary, composed of pale blotches between veins, the space between it and t. p. line is slightly darkened, with a well-marked black dash across it below costa, and another beyond lower portion of cell. The terminal space is somewhat paler than subterminal, the veins, however, being rather broadly darkened. A rather faint dark terminal line. Fringe concolorous, somewhat paler at base. Orbicular rather small, concolorous, pale-ringed. Reniform quite strongly inwardly oblique, more or less well-developed tooth projecting inward from lower portion, an outer pale ring, within which is a darker ring, the centre again becoming pale. Lower portion with some blackish scales. Hind wing pale blackish-fuscous, darker outwardly, with a well-marked discal dot. Fringe slightly paler, with slightly darker mesial band. Head and lower half of collar

dark blackish-brown, upper half of collar and thorax reddish-brown, concolorous with fore wing. Beneath, fore wing fuscous centrally, with rather even terminal yellowish band. Discal dot and mesial band obscurely marked. Hind wing paler than fore, yellowish along costa and outer margin. Discal dot well marked. Mesial band rather irregular.

In some specimens the inward projection from lower end of reniform is very slight. Otherwise there seems to be little variation in the species.

Type.— ♂. Huachuca Mts., Arizona, August.

Dypterygia minorata, n. sp.— ♀. Expanse, 30 mm.

Fore wing dead black, exactly the same shade as *scabriuscula*, which species the present one resembles in a general way. The fore wing is crossed and marked with a number of velvety-black fragmentary lines, as well as blackish streaks along veins. A few whitish scales along the outer end of cell indicate position of reniform. The s. t. line can be made out in an indefinite way, but is only well marked at inner margin. The outer portion of the wing is lightened with flesh-coloured shades, quite well marked at inner angle beyond t. p. line, and has a W mark in centre of wing, cutting through fringe. Inner margin also presents a narrow flesh-coloured band, crossed by a couple of black streaks. Fringe slightly scalloped, concolorous, with an admixture of flesh-coloured scales. Three minute flesh-coloured dots on costa before apex, preceding which are four or five outwardly oblique black bars, indicating the inception of ordinary lines.

Hind wings blackish-fuscous, darker outwardly, with barely traceable pale mesial band, fringe pale, somewhat darkened from apex to middle.

Beneath, fore wings smooth, even blackish-brown, gray, with a fleshy tinge along costa, somewhat paler at outer edge. The beginning of the mesial band can be seen, but not traced across wing. Hind wing yellowish-white towards base, reddish-brown along costa and beyond the well-marked mesial band.

Head and collar gray, mixed with flesh-coloured scales. Well-marked narrow black band through middle of collar. Thorax concolorous with fore wings. Patagiæ with some black scales along border. Thorax posteriorly with many flesh-coloured scales, forming a pale spot as in *scabriuscula*, though not so distinct.

Type.— ♀. Santa Catalina Mts., Ariz. Other specimens from Kerrville, Texas.

Papaipema peralta, n. sp.—Expanse, 25 mm.

Ground colour seal-brown, with slight olivaceous tint. Ordinary markings faintly indicated by fine delicate tracings of white scales. Remaining portions of fore wing are also sparingly dusted with white. Basal half-line scarcely to be distinguished. T. a. line rather straight, inclined outwardly to middle of inner margin, slightly wavy. T. p. line slightly outcurved over cell, thence almost in a straight line to inner margin, two or three millimeters beyond t. a. line. S. t. line faintly indicated. A scalloped terminal line and white line at base of fringes, which are in turn tipped with white. Orbicular moderate in size, round, concolorous. Reniform subquadrangular, rather large, concolorous, pale linear streak through centre. Several white points along costa. The wing is a trifle darker through the median space than either before or after it. Hind wings similar in colour to fore, though somewhat more blackish outwardly and more yellowish inwardly. Discal bar obscurely marked. Fringe paler than wing, with dark mesial band. Head and thorax concolorous with fore wing, scales tipped with white. Abdomen concolorous with hind wing. Thoracic crest well marked in one specimen.

Beneath, fore wing dark centrally, paler along inner and outer margins. Three or four pale dots on costa near apex. Hind wing paler than fore. Not very prominent discal dot and mesial band. Faint traces of mesial band also in fore wing. Body parts beneath concolorous with wings.

Type.—Several specimens. Cochise Co., Ariz. *Peralta* is the smallest species of the genus known to me, and without the endorsement of Prof. J. B. Smith I should hardly have thought of placing it in this genus.

Mamestra Antonito, n. sp.—♂. Expanse, 35 mm.

Fore wings, ground colour rather pale pearly-gray, with somewhat of a greenish-yellow cast. In most places largely obscured by dark brown and black shades and lines. Basal line double, fragmentary, pale-filled, indicated chiefly by dots on costa and below median vein. T. a. slightly outwardly oblique, irregularly dentate, double, pale-filled, outer line distinct, inner only apparent as dot on costa. Black diffuse median shade. T. p. line moderately exserted beyond cell, thence with slight inward curve to inner margin. Inner portion black, distinct, scalloped, with outward projections on veins, outer portion scarcely traceable. A series of small black points on veins beyond line. S. t. line white, incomplete and rather fragmentary, preceded by some black scales and followed by well-marked

black shade, most distinct opposite cell and towards inner angle. The s. t. line is projected through to outer margin, forming a rather obscure W mark in centre of wing. The mesial portion of wing is more covered with black scales than the subterminal. Orbicular distinct, round, black-ringed, pale, with dusky centre. Reniform, kidney-shaped, large, erect, distinct, filled with ground colour, somewhat darkened at upper and lower portion. Claviform short, outlined in black. A black wavy line at base of fringe, which is dark and cut with white at ends of veins. Hind wings fuscous brown, with rather distinct discal bar. Fringe slightly paler, with slightly darkened line at base.

Beneath, fore wing grayish along costa and outer margin, else pale-fuscous. Mesial band extending partly across wing from costa. Orbicular and reniform evident as pale rings. Fringe checkered. Hind wings somewhat paler than fore, more grayish throughout. Discal bar and median band. Head, collar and thorax mottled, concolorous with fore wing, abdomen with hind wing. Antennæ bipectinate in male.

Types.—Huachuca Mts., Ariz.

Mamestra Palmillo, n. sp.—Expanse, 40 mm.

Fore wings yellowish-brown, with darker purplish shades. Basal line barely traceable. T. a. line not discernible in the specimen before me, though possibly it would be so in a fresher specimen. T. p. line noticeably exserted beyond cell, scalloped between veins. S. t. line indicated by a slight darkening of the wing before it. Veins darkened, especially in terminal portion of wing. The shade before s. t. line is emphasized in the intervenular spaces. Fringe concolorous, with well-marked darker blotches between ends of veins. Shallow dark lunules at edge of wing between veins. Orbicular round, dark-ringed, centre concolorous. Reniform of good size, upright, constricted in centre, dark-ringed, within which is a second dark ring, filling concolorous. Claviform present, moderate in size, dark-ringed. Hind wing pale yellowish-white, fringe somewhat darker from admixture of yellow and purplish-brown hairs.

Head and thorax concolorous with fore wings, the patagiæ being bordered with somewhat darker hairs, as is also the thorax posteriorly.

Abdomen with somewhat more of a pinkish tinge than wings.

Beneath, fore wings somewhat paler than above, slightly darkened towards costa and apex. Fringe checkered. Hind wings similar to fore, except the fringe is not checkered.

Type.—Southern Arizona.

(To be continued.)

INSECTS AS THE FOOD OF SQUIRRELS.

BY WM. T. DAVIS, NEW BRIGHTON, N. Y.

Toward the end of August and early in September many acorns, with their cups attached, fall from the oaks and lie beneath the parent trees. When first they reach the ground they look perfect, but directly the *Balaninus* larvæ begin to bore out through the cups and enter the ground, as is their habit. When they escape from hickory-nuts, the larvæ of these long-snouted beetles choose the thin places between the ridges, which are so characteristic of the shell-bark nuts, for instance, and the easiest way out from an acorn must be through its base and cup. The larvæ, however, may be cut short at this part of their development, for they are much sought after by squirrels, who seem to esteem them highly. The problem that presents itself to the squirrel is to tell which acorns contain larvæ. He makes, considering the conditions, the simplest and most direct test. He bites a small part of the cup off so as to expose the base of the acorn, and then punctures it slightly. He can, no doubt, tell very quickly by the odour if there is a larva within, and if such proves to be the case, the hole is enlarged and the much-desired morsel secured. I have found on Staten Island scores of the large acorns of the red oak that had been treated as mentioned above, and on another occasion many scarlet-oak acorns that had been treated in the same way, all of which goes to show how enterprising and intelligent the squirrels really are.

Another example of the insect-eating habit of a squirrel was observed at Lakehurst, N. J., where beneath a pitch-pine tree, mid the scattered remains of many cones, from which the seeds had been extracted, were found a number of *Clisiocampa* cocoons. They had been brought from a near-by wild-cherry tree, that had been badly eaten by these larvæ, and still contained some of their old tents. Each cocoon had been opened either at the end or side, and the pupa extracted. Certainly in this instance the squirrel did a good act, and also showed his liking for insects.

On the 29th of June, some years ago, I saw a chipmunk catch a moth, pull off its wings, and eat it. I have often fed captive gray and flying squirrels bits of raw meat, so their fondness for *Balaninus* larvæ and other insects is not to be wondered at, but what is chiefly of interest is the intelligence shown in making their captures.

January, 1907

A FEROCIOUS WATER-BUG.

BY G. W. HARVEY, ADIN, CALIFORNIA.

In the warmer streams and pools of California lives a creature whose character is very aptly portrayed by the above title. He is not only ferocious, but a cannibal as well.

Among the boys and girls who go wading in the streams this fierce bug is known by the name of "toe pincher;" because he frequently mistakes their bare toes for lawful quarry, and thrusts savagely into them with his scimitar-like proboscis. They tell me that his bite is very painful, though not at all dangerous.

Scientifically he bears the title of *Pedinocoris macronyx*, Mayr. He is of a uniform dull brown colour, with a barely perceptible mottling on the wing-sheaths or elytra. The females are possibly a shade darker than the males. He has prominent, you might say protruding, black beady eyes, and his head terminates in a long curved proboscis, seven mm. in length, which gives him a very odd and fiendish appearance. His legs are perceptibly hairy, and armed with sharp, curved claws, very long and prominent on the two front legs, which are strong and so placed that they work in a vertical plane, jointed at an acute angle, and might easily be mistaken for jaws or mandibles. The claws on these front legs are jointed so that they can be bent down upon the first joint of the leg, virtually clamping the prey in a vice, as it were. It is with these that he seizes his prey, and holds them in a herculean grip until devoured. He is three and a half centimetres long, with a reach of one and a half cm. more in his two front legs, and is two cm. broad across the widest part of the back.

His range extends from northern California—possibly further north—to Central America, and very likely on into South America.

He is gifted with a voracious appetite, and his aggressive prowess as a hunter is something appalling to the owner of an aquarium who chances to secure him as a specimen, without having made his previous acquaintance. I well remember my first experience.

I had a beautiful collection of aquatic insects, fish and tadpoles from the streams about Watsonville, California, and it was on one of my collecting rambles that I discovered Mr. *Pedinocoris*. He was a wonder to me, and I took him home, highly elated over the prospect of a new creature to study.

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It was about nightfall when I placed him in the aquarium, and I was around early the next morning to see how he had fared in his new quarters. Imagine my surprise to find him sitting complacently on a stock of *Sagittarius* devouring the largest fish in my collection, a beautiful trout about three inches long, while all about his new quarters were scattered the skins of many victims, including young frogs, tadpoles, fish, snails and various other smaller fry. He had fared altogether too well, much like a weasel in a henhouse, with a propensity to kill everything in sight. At that rate he would very soon totally depopulate my aquarium, so I removed him to less commodious and more sparsely populated quarters, and confined him to a diet of tadpoles and froglings. He would devour dozens of them in twenty-four hours, and have his quarters fairly stinking with their remains.

He captured his prey as they swam near him by a sudden dart forward. The powerful hooked front legs were thrown over the victim, which was pinned fast more quickly than the eye could follow, and the sharp, curved, horny-pointed proboscis was thrust into its quivering sides, never to be withdrawn until the skin was a limp and flabby sack of lifeless material perfectly depleted of all the nourishing liquids and elements pertaining to the body in life. His habit was to lurk in the more secluded and darkened places in the aquarium, backing up occasionally to the surface for a breath of fresh air, and quite often I would see him, after returning to his lurking place, raising and lowering the wing-sheaths as though breathing, and beneath them could be seen a large bubble of air, advancing and receding with the up and down motion of the wings, and looking for all the world like molten shining silver. The spiracles are quite prominent, and placed at the lower extremity of the abdomen, as is usual in water-beetles.

Sometimes I would take him from the water, and then he would "play possum" for from three to seven minutes, but when he did wake up was full of life and action. If I caught him and held him securely, he would, after a moment or two, eject a few drops of clear liquid from the spiracles with such force that it often bespattered objects three and four feet distant.

Occasionally he would entertain me with a semi-subaqueous serenade. He would come to the surface, where there was a thick mass of duck-weed floating, extrude the spiracles, and make a soft chirping noise, not wholly unlike a subdued cricket song. I puzzled over this a long time

before I could make out just where the noise came from, but I finally succeeded in observing him in the act, and verified it many times afterward. That a song could emanate from so odd a source as the ventral spiracles of a water-bug seemed ultra-natural, but there was no disputing the facts. When engaged in his chirping, one had to look very closely among the duck-weed to discover the spiracles, but once found, a rhythmical contraction and relaxation could be distinctly noted with every note of the song, which was produced much more slowly than that of our crickets.

The breeding season of this creature at Watsonville, California, where it is very abundant, is from April to June, and during this time from two to four sets of eggs are hatched, and it is one of the most interesting insects to study in all the domain of entomology.

The female glues the eggs of the clutch tight and fast to the back of the male, thereby sealing his wing-covers into a solid case, so that it is impossible for him to fly. Here they stay through the whole period of incubation, unless by some accident their bearer is removed from the water for some considerable time, when the whole mass of nidus and eggs sheds off, and leaves the male free to fly once more to his wonted element.

In depositing the eggs, a translucent adhesive precedes the egg, which is partly incased within it, adheres to and stiffens upon the wing-sheath, holding the egg in a more or less perpendicular position upon the back of the male. I would be glad to know the composition of this mucilaginous adhesive, that will remain plastic at so low a temperature, harden and remain tenaciously adherent in water. The eggs are deposited one at a time, close together, and stand at all angles, from perpendicular in the centre to a cant of forty-five degrees upon the outer edges of the nidus. They are not all deposited at one time. Part of them will be deposited one night and the rest the next night, or possibly it may be several days before they are all deposited. The female will lay anywhere from seventy to one hundred and seventy-five eggs upon the back of the male, and strangest of all, every egg is right end up, so that in hatching the young insect always escapes from the top of the egg. It very often happens that some of the eggs prove to be unfertile, and whenever they do, instead of remaining in the nidus in an addled condition until the others hatch, they loosen, and are shed off from among the mass of fertile eggs,

and are replaced with fertile ones. This takes place as late even as the eighth day of incubation.

The duration of incubation is from ten to twelve days, at the end of which time the egg-cases and adhesive nidus that holds them are cast off entire, providing there be no late-laid eggs, in which instance the whole mass, including empty eggs and nidus, remain attached to the back of the male until the last one is hatched. And just why it is that a few unfertile eggs will drop away from among the mass of fertile ones and leave the parent before incubation is complete, whereas, on the other hand, the empty egg cases and nidus remain until the very last laid egg is hatched, I cannot understand.

The eggs are a long oval, five mm. long by one mm. thick, and are the same colour as the parent bug. The cast-off nidus and egg cases resemble a knobbed shield as nearly as anything that I can think off, being an oblong oval, with concave surface to back of parent.

During the period of incubation the male spends much of his time in aerating the eggs. This is done by gently raising and lowering the wings so that the air taken in at the surface, and held under the wing-cases, is moved back and forth beneath the mass of eggs, which take it up little at a time, as the needs of incubation require. The adhesive nidus into which the eggs are set must perform the same office or function for the gestating insect that the placenta in warm-blooded creatures performs for their gestating young, with this difference, that in warm-blooded animals air is taken into the blood from the lungs, and transferred to the placenta through the circulation, while in the creature under discussion the air is absorbed directly through the pores of the wing-sheaths.

At the end of incubation the male comes to the surface, and with his back partly out of the water, the young begin to appear.

The first thing seen after the rupture of the egg.case is the beady-black eyes. Then the male continually raises and lowers the wing-sheaths and executes a jerking motion along with it, at regular intervals. The young insect is extruded from the egg-case by easy stages, and in a manner very similar to the birth of a mammal. I am not sure whether the power of extrusion lays wholly in the egg-case or not, but incline to the belief that some pneumatic pressure is brought to bear on the fœtal insect from the air beneath the wing-sheaths of the male, which is kept in constant motion, and which of necessity must exert more or less pressure.

In from seven to twenty-five minutes the birth is accomplished, and you have before you a perfect counterpart of the parent, quickly swimming free and ready for a meal. At birth the insect is about five mm. long by two and a half mm. broad, of the purest white, rapidly changing to light straw-yellow and brown, and in two or three hours at most they are the same colour as the parent, and if prey be not abundant, very likely feasting on their younger brothers and sisters. This latter trait is evidently an hereditary one, because the parent very often makes a meal off his own offspring.

I noticed one peculiar thing in regard to the birth of these insects, and that was, when the birth was forcibly terminated by my assistance they were not properly vivified. They would lie for many minutes apparently half dead, whereas those that were maturely born were lively and perfectly vivified. Nature's ways are marvellous, and the birth of an insect is just as elaborately provided for as that of the higher animals.

These creatures disdain nothing in the food line that they can handle, either dead or alive. They often come to the surface for floating insects, worms, caterpillars, moths, butterflies, dragon-flies, grasshoppers, crickets, etc., etc., and after extracting all the nourishing properties by suction, cast the empty skin aside.

Their migrations are performed after night, as is the habit of the so-called "electric-light bug."

So far I have discovered but two species of this insect, one inhabiting the warmer zones of California and countries further south, and which I have described in this article, and a smaller variety that inhabits the warm springs of Northern California, and which is hardly half the size of the one here reported.

PREOCCUPIED NAMES OF BEES.

Through the kindness of Prof. Cockerell I have learned that two names recently used by me are preoccupied, and therefore propose the following:

Centris Costaricensis, n. n., for *C. Friesei*, Cwfd., in Trans. Am. Ent. Soc., XXXII, 158.

Halictus glabriventris, n. n., for *H. Vachali*, Cwfd., in CAN. ENT., XXXVIII, 300.

J. C. CRAWFORD, Dallas, Texas.

NOMENIA AND EUCHŒCA FINALE.

BY RICHARD F. PEARSALL, BROOKLYN, N. Y.

In replying to recent papers by Dr. Dyar[1] and Rev. G. W. Taylor,[2] my desire is to end a controversy, not prolong it. First, as to Nomenia. When this genus was established, it was understood by most entomologists that the western species of Euchœca, which had been associated with it, was a form of our eastern species, now known to be the *comptaria* of Walker, thus the name of *12-lineata* was affixed to the type. Later, when it became apparent, with more material at hand, that the western species of Euchœca was really distinct, it seemed to me that Dr. Packard's description applied, with its reference to the antennæ as "well ciliated" to this Euchœca, not to Nomenia with its unipectinate antennæ; hence, I was using a preoccupied name, and described the Nomenia as *unipecta*. My desire was to make the description fit best the species placed under it. To my mind the description will cover either species, excepting the antennal structure, yet, offsetting this come the two references on pages 83 and 86 of the Monograph, where he states, first that they are pectinate, and again that they are not. But Dr. Dyar says I violated established usage in so doing, and though unconvinced, to close an argument, I will accept their decision, acknowledging the compliment extended by both, in using my name for the Euchœca species.

As to Euchœca: Dr. Dyar supposes I had neglected the names of *condensata* and *inclinataria*, Walker, but I had learned through examples of *lucata*, Guen., sent to Mr. L. B. Prout for comparison with Walker's type in the Brit. Mus., that *condensata* was the same. I quote his reply:

"Euchœca lucata, Guen. (teste, Packard) = condensata, Walk., certissime!" The absence of marginal black line in *lucata* and in the Walker type makes this certain, if any doubt existed. *Inclinitaria* is, vide Hulst (Entom. News, Vol. 6, p. 70, 1895), a synonym of ferrugata, Clerk, and this has been confirmed.

When Dr. Packard described *perlineata* in his Monograph, 1876, he assembled under it the original types described in 1873 from Albany, N. Y., May 4 (Lintner), Brooklyn, N. Y. (Graef), West Virginia, April (Mead), Mt. Washington, N. H., July (Morrison). The dates given, as I

1. CAN. ENT., Vol. 38, page 110.
2. CAN. ENT., Vol. 38, page 203.

will show, are very important. *Perlineata* flies very early, and is short-lived. The West Virginia types (co-types we would call them now) in April. I have it from New Brighton, Pa., April 13–May 5. In this locality I take it from April 21–May 2. The Albany types May 4. Last year I went to the Catskill Mts., fifty miles from Albany, on May 23, hoping to take it there. I saw none, and rashly published the statement that it was not found there. This year I went on May 2nd, and found it flying, taking up to May 14 some 17 specimens, after that only one worn-out ♀ on May 20, though I searched diligently.

Exhumata did not make its appearance until two weeks later, June 4, its usual time as shown by my dates of the past ten years, and was common until the second week of July. Now, eliminating from the group those from Brooklyn, N. Y. (Graef), as without date, the above record will show, with the exception of those from Mt. Washington, N. H., July (Morrison), they were, including the Albany types, all examples of *perlineata*, while the date (July) tells plainly that those from New Hampshire were as surely *exhumata*. These last were figured on plate, as Mr. Taylor points out, and if the statement that for thirty years we have given to this species the name of *perlineata* has any force, which it has not, I would point out that Dr. Packard committed an error precisely similar in the case of *Caripeta angustiorata*, recently published by Mr. Swett (Journal N. Y. Ent. Soc., Vol. 14, page 128).

Descriptions I do not underestimate, I trust, and in this case I have examples of *perlineata* which answer well to it. If we are to be allowed to arbitrarily set aside the types or co-types upon which an author bases his description, as Mr. Taylor has done, it must be, in my judgment, for better reasons than exist in this case.

Hence, I hold to my conviction that *12-lineata* having "gone west," where it rightly belongs, that *perlineata*, as represented by the co-types in the Packard collection, is the *comptaria* of Walker, and that *exhumata* is to remain a valid species.

NOTE.—Since writing the above the thought occurred to me that perhaps the original types of *perlineata* had been returned to Dr. Lintner. I addressed a query to Dr. E. P. Felt, State Entom., and his reply, "The types of *Larentia perlineata*, Pack., are in the Lintner collection, and in excellent condition," caused me to journey to Albany to inspect them. The types are the same with those in the Packard coll. from West Va.

(Mead), and bear the label in Dr. Packard's handwriting, "Larentia perlineata, Pack., Albany (Lint.), type," and another old label in Dr. Lintner's hand, "May 4, '70." Dr. Packard had only this pair before him in 1873 when his description, which was copied almost verbatim in the Monograph, was made. In view of this fact, the contention of Mr. Taylor, that the description was made from another species, has no weight, and his argument, based upon *description* alone, though strongly and skillfully presented, is shown by these types to be worthless. *Descriptions* make the world acquainted with the type, but were never intended to take precedence of it, just *because* they are open to individual construction as to their meaning.

Exhumata is represented by five examples, one labeled White Mts., two from Schenectady, N. Y., July 10, 1876, and June 12, 1875. These three are called "Oporabia 12-lineata, Pack." The other two are from Stony Clove, Catskill Mts., June 26, 1874, and labeled "Epirrhita 12-lineata, Pack." (note the date), though Mr. Taylor asserts that the species has universally been known as *perlineata* for thirty years past.

Really, no one knew what to call his specimen until now, and I feel that the thanks of the entomological fraternity are due the CANADIAN ENTOMOLOGIST for the valuable space it has accorded us in "threshing out" the real status of the members of this group.

Incidentally, *Caripeta angustiorata* is represented in the Lintner collection by three examples, two of which are the *criminosa*, Swett, a distinct and well-marked species.

The species following will stand in the future as indicated:

Nomenia duodecimlineata, Packard.
= unipecta, Pearsall.
Nomenia duodecimlineata, Pack.
var. secunda, Pearsall.
Euchœca Pearsalli, Dyar.
= 12-lineata, Auct. (western).
Euchœca comptaria, Walker.
= 12-lineata, Auct. (eastern).
= perlineata, Pack.
= salienta, Pearsall.
Euchœca exhumata, Pearsall.
Euchœca lucata, Guenee.
= condensata, Walk.

NOTES ON SOME NEW MOSQUITOES FROM JAMAICA, WEST INDIES.

BY M. GRABHAM, KINGSTON, JAMAICA.

The following are brief notices of three new species of mosquitoes, full accounts of which will be published in the second edition of "The Mosquitoes or Culicidæ of Jamaica," now in course of preparation.

Ædes uncatus, n. sp.—Close to *Stegomyia mediovittata*, Coq., from Santo Domingo (CAN. ENT., Feb., 1906, p. 60), but the subdorsal thoracic lines are made up of light yellow scales throughout their whole length. Full-grown larva with six or seven separate comb scales, each scale with a simple stout curved spine arising from a pear-shaped base. (Fig. 1.) The larvæ of this form, collected from hollow trees, have been sent to me from several localities near Kingston (Waverley Estate, Constant Spring: woods above Rockfort). In all the specimens examined the comb scales had simple spines unlike the Santo Domingan form, which has trifid spines (Dyar and Knab, Jour. N. Y. Ent. Soc., XIV, Pl. V, flg. 11). I am indebted to Dr. H. G. Dyar for comparing the larvæ and adults of these two species. Bred specimens vary greatly in size, the largest attaining about 6 mm. in length. The females bite blood without hesitation.

FIG. 1.—Scale from comb of Ædes uncatus.

Mansonia Waverleyi, n. sp.—Close to *M. signifer*, Coq., but with an additional curved line of white scales on each side of the mesothorax. (Fig. 2.) This line is usually somewhat broken. I am likewise indebted to Dr. Dyar for examining the larvæ and adults of this species; he writes that the larvæ also differ in the arrangement of the abdominal plates. The larvæ were collected from thick coffee-like water found in hollow mango trees at Waverley Estate, Constant Spring, Jamaica. They are grayish-white in colour, and appear to be peculiarly inactive, lying at the bottom of the jar for long intervals. The pupa stage lasted five days. Length of adult 5.5 mm.

FIG. 2.—Thoracic ornamentation: Mansonia Waverleyi.

Howardina inæqualis, n. sp.—Near *H. aureostriata*, Gbm. (CAN. ENT., May, 1906), but with somewhat broader thoracic lines. The face hairs of the larva are as follows: Anteantennal hair 5- to 8-rayed, upper epistomal hair double, lower about 10-rayed. The compound hair of the dorsal group in the terminal segment is about

6-rayed. In *H. aureostriata* the upper epistomal hair is usually single, and the compound hair of the dorsal group on the terminal segment is 10–12-rayed. The most notable differences are to be observed in the anal gills, those of *H. inæqualis* being broadly lanceolate and pigmented, the lower pair only one-half the length of the upper pair, which are one-third the length of the longest hairs of the ventral hair group, while in *H. aureostriata* they are nearly equal in size, narrow, slender and transparent, and about as long as the hairs of the ventral tuft. The larvæ collected from hollow trees (chiefly *Anona palustris* L.) by the seashore, Kingston, have long, slender, pale red bodies, covered with rayed hairs; a pair of large air vessels in the thorax are seen as two conspicuous silvery spots. The females are troublesome blood-suckers in the woods. Length of adult, 2.5 mm.

NOTES ON THE SWARMING OF A SPECIES OF CRANE FLY.

BY CHAS. N. AINSLIE, WASHINGTON, D. C.

The swarming habits of various families of flies, notably the Chironomidæ and Culicidæ, have been known to the world probably for centuries, since even unscientific people must have often been interested in the phenomenon, perhaps, indeed, alarmed at it, so prodigious have sometimes been the numbers of flies involved in these gatherings. Accounts of extraordinary swarms have been current in print for more than a hundred years, but these stories deal for the most part with the size and actions of the mass of flies, and rarely attempt an adequate explanation of the peculiar gathering, from the view-point of the individual insect. A few species of the Tipulidæ have been noted as celebrating the same sort of air dance as the smaller forms, but I have been able to find nothing in print that describes in detail the mysterious performance. Having been fortunate enough recently to witness and study this feature of the life-history of one species of the Tipulidæ, *Trichocera bimacula*, I venture to record the notes made at the time, in the hope that some more competent observer may write a more complete story than is possible for me.

Nov. 2nd, 1906, was a clear, cool day, with a fresh northwest breeze. Toward sundown the wind died away to an occasional, hardly-perceptible breath, and the mercury fell to a point where it was quite chilly, perhaps to between 45 and 50 degrees above zero, Fahr. The writer chanced to be returning to Washington from Arlington on foot, and the way led along the steam car track, which at one point skirts the bank of the Potomac,

not more than a stone's throw from the tide-water mark. The railway is here bordered by thickets of brush that fence both sides, and make an open lane not much wider than the roadbed. The sun was just sinking behind the heights of Arlington, and the air was decidedly cool as I reached the track. In spite of the chill, or more properly, I suppose, because of it, the lane through the underbrush was occupied by dancing swarms of Trichocera that hovered at various heights from three feet to ten, each swarm maintaining itself in a fairly constant position, except when a whiff of air blew it about. Occasionally these assemblies would coalesce or subdivide, but not often. The swarms were of all sizes, from a dozen or two individuals up to hundreds.

It required several minutes of close attention to get an intelligent idea of the individual movement within each collection of dancers. The first impression was of chaotic activity, a sort of delirious motion without order or purpose. And it was only by singling out and following an individual that the riddle was read. Each fly went through three movements, and repeated these continually, a slow curving rise for ten or fifteen inches, a rapid perpendicular fall, and a peculiar swaying flight that affected the exact position of the swarm in the air. Even after the movement had been analyzed, a look through the swarm at an object beyond gave the former effect of whirling atoms and rapid motion.

A sweep of the net through a swarm revealed, as I had expected, that only males were performing the airy incantation. But the "canto" was unheard, probably because of the much slower wing-motion of the Tipulidæ as compared with the smaller and more active midges, with their high-keyed song. At any rate, I was unable to hear any sound from even the largest swarm.

Creeping cautiously beneath a well-defined body of dancers, I was able to watch them clearly outlined against the fast-darkening sky and see every movement. No females were observed to fly into the swarm, yet before I left for home I was able to distinguish a difference in the swing of the flies, that indicated the presence of a female. Just what the difference was is hard to describe, but somehow the dancers, instead of neatly avoiding each other as before, would interfere, the lines of flight seemed to be more angular and less graceful, a series of tackles could be distinguished as if a number of small fights were in progress, until finally a pair would drop from the swarm, clumsily steering for the grass and bushes that bordered the open.

For some reason, either the scarcity of females, the coolness of the evening, or the lateness of the hour, these matings were infrequent, and during the hour I remained I saw less than a dozen pairs leave the throng. Several times I captured the pair as it was flying away, and except in one case, when the net engaged an extra male, evidently a straggler from the swarm, I took only a male and female. It might be remarked in passing that in this particular species at least the sexes are easily distinguished.

The exact manner in which mating was accomplished could not be ascertained with any definiteness, the interval between pairing and disappearance being so extremely brief that extended observations were impossible. The claws of the species are simple, and if the same rule holds that Mr. Knab finds obtains among the Culicidæ, the act of mating is a simple embrace, without the swinging apart that has been observed among the tooth-clawed mosquitoes.

As is probably the case with most, if not all, weak-winged flies when maintaining their equilibrium in a definite spot in mid-air, these Tipulidæ were observed always to face toward the light air-currents that from time to time came through their ranks and blew them gently about.

An hour of close watching failed to discover any variations in the simple movements of their performance. The gathering darkness, while putting an end to observation, seemed to be no check to their gaiety, for their numbers were not diminishing when I left the scene. Possibly, after the manner often noticed among so-called sentient beings, the amusement may have lasted far into the night.

ERRATA.—Vol. XXXVIII., p. 400, line 12 from bottom, for "sickly" read "silky."

Page 425, line 7 from bottom, for "Xanthorhöe *possaria*" read "*fossaria*."

The Editor much regrets the delay in issuing this first number of a new volume of "THE CANADIAN ENTOMOLOGIST"; it has been caused by his absence from home attending the recent scientific meetings in New York.

Subscribers are reminded that the annual subscription of one dollar is now due, and should be sent to the Treasurer by Post-office or Express money order (not by a cheque on a local bank) or by registered letter. As a rule, the magazine is sent until ordered to be discontinued, so as to relieve subscribers of inconvenience.

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